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Vadim Y. Banine

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EXAMINER

NGUYEN, LAM S

ART UNIT

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2853

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 09/943,758	<b>Applicant(s)</b> BANINE ET AL.	
	<b>Examiner</b> LAM S. NGUYEN	<b>Art Unit</b> 2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01/24/2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-13, 15, 16 and 18-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13, 15, 16 and 18-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-12, 15-16, 18-22, and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (EP 1020897 A1) in view of Klebanoff et al. (US 6533952).

#### **Referring to claims 1, 10, 15, 18-22:**

Tanaka et al. discloses a lithographic projection apparatus comprising:

- a radiation system to supply a projection beam of radiation (*FIG. 4, element CA*);
- a support structure adapted to support patterning structure which can be used to pattern the projection beam according to a desired pattern (*FIG. 4, element R*);
- a substrate table to hold a substrate (*FIG. 4, elements WS*);
- a projection system to project the patterned beam onto a target portion of the substrate (*FIG. 4, element 300*),
- a gas supply (*FIG. 4, element 150 and 160*), configured and arranged to supply a gaseous to a space (*FIG. 4, element CA*) containing a mirror (*FIG. 4, element 201, 203, and 208*);
- at least one sensor selected from the group comprising a reflectivity sensor to monitor a reflectivity of said mirror and a pressure sensor to monitor a background pressure in said space (*FIG. 4, element PSI*); and

a gas supply control to control said gas supply in responsive to a signal from said at least one sensor (*FIG. 4, element 402: The output of sensor PS1 is inputted to CONTROL CIRCUIT 402 that outputs the signal 1 to control valve V1. Since either supply or discharge gas from the case CA affects the current amount of gas in the case CA, controlling the valve V1 to adjust the gas discharge is considered as controlling the current amount of gas in the case CA supplied from the gas source*).

Tanaka et al. however does not disclose wherein the supplied gas is hydrocarbon such as alcohol or ethanol used to control a thickness of a cap layer of hydrocarbon formed on the mirror, which is a collector mirror, using the gaseous hydrocarbon, wherein the gaseous alcohol is supplied to said space at a pressure sufficient to achieve a thickness of said cap layer which does not increase substantially over time, and wherein the alcohol forms a cap layer on said mirror, wherein the projecting causes sputtering of the cap layer, and wherein the gaseous alcohol is supplied to said space at a pressure sufficient to achieve a thickness of said cap layer which does not increase substantially over time, wherein, in use, the layer of hydrocarbon is formed on the mirror by adsorption of the gaseous hydrocarbon.

Klebanoff et al. suggests that in order to protect a surface of a component (such as a collector/multilayer mirror (*column 3, lines 50-54 and column 4, lines 10-20*)) exposed to or sputtered by a radiation source, a gas, typically a hydrocarbon such as alcohol, is introduced into the environment of the surface (*Abstract; column 3, lines 62-66; and column 4, lines 60-65*) to eliminate reactive oxygen species that could oxidize the surface and degrade its reflectivity (*column 3, line 65 to column 4, line 8*). In other words, such gas is used to control a thickness of a layer of hydrocarbon formed on the mirror, wherein the thickness of the layer does not increase

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substantially over time (**Referring to claims 7-9, 11-12**), and wherein the alcohol forms a cap layer on the mirror, wherein the radiation causes sputtering of the cap layer, and wherein the gaseous alcohol is supplied to said space at a pressure sufficient to achieve a thickness of said cap layer which does not increase substantially over time (**Referring to claims 15-16 and 20-21**) (*column 3, lines 61 to column 4, line 5: "Prior to exposing surface 210 to incident radiation, a small amount of a hydrocarbon gas that will also bind to surface 210 is admitted to the system" means that the binding of the hydrocarbon gas to surface 210 forms a cap layer of hydrocarbon on the surface 210 before the cap layer is sputtered by the incident radiation. Moreover, because the sputtering will cause the hydrocarbon molecules bound to the surface 210 be dissociated, the thickness of the cap layer of hydrocarbon would not increase substantially over time. In addition, since the pressure gas is maintained at a certain value, the thickness of the hydrocarbon layer would not increase substantially over time due to the increase of the pressure gas*), wherein, in use, the layer of hydrocarbon is formed on the mirror by adsorption of the gaseous hydrocarbon (*column 2, lines 14-16: "Surface 110 has both hydrocarbon and water molecules adsorbed thereon"*) (**Referring to claims 23-26**).

Therefore, it would have been obvious for one having ordinary skill in the art at the time invention was made to modify the gas supply source disclosed by Tanaka et al. to supply hydrocarbon gas as disclosed by Klebanoff et al. The motivation for doing so would have been to eliminate reactive oxygen species that could oxidize the surface and degrade its reflectivity as taught by Klebanoff et al. (*column 3, line 65 to column 4, line 8*).

- **Tanaka et al. also discloses the following claimed invention:**

**Referring to claim 2:** wherein the radiation system contains said space containing the mirror (*FIG. 4, element 201, 203, and 208*).

**Referring to claim 3:** wherein the radiation system comprises one of a laser-produced plasma source and a discharge source adapted to supply a beam of extreme ultraviolet (EUV) radiation as said projection beam (*FIG. 4, element 100*).

**Referring to claims 4-6:** wherein said beam of extreme ultraviolet radiation has a wavelength of less than about 50nm, in the range of from 8 to 20nm, or from 9 to 16 nm (*column 42, lines 23-25*).

2. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (EP 1020897 A1) in view of Klebanoff et al. (US 6533952), as applied to claim 10, and further in view of Duveneck et al. (US 6469785).

Tanaka et al., as modified, discloses the claimed invention as discussed above and also discloses wherein the method further comprises adapting the amount of gaseous hydrocarbon supplied to the space such that at least part of at least a top layer of said minor undergoes sputtering. However, Tanaka et al., as modified, does not disclose wherein said mirror comprises at least 40 multilayers.

Duveneck et al. discloses a multilayer mirror that comprises of 40 sequenced layers in order to obtain high efficiency and high optical output (*column 9, lines 2-7 and lines 30-35*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time invention was made to replace the mirror disclosed by Tanaka et al., as modified, by the one comprising of 40 layers as disclosed by Duveneck et al. The motivation for doing so would have

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been to obtain high efficiency and high optical output as taught by Duveneck et al. (*column 9, lines 2-7 and lines 30-35*).

### ***Response to Arguments***

Applicant's arguments filed 01/24/2008 have been fully considered but they are not persuasive.

First of all, in response to the Applicant's argument that Klebanoff did not teach a hydrocarbon layer, the Examiner cites that Klebanoff's teaching "a small amount of a hydrocarbon gas that will also bind to surface 210 is admitted to the system" (column 3, lines 63-65) means that the binding of the admitted hydrocarbon gas on the surface 210 forms a hydrocarbon layer on that surface.

Secondly, in response to the Applicant's assertion that Klebanoff was silent about sputtering involving removing material due to bombardment of the material by energetic ions. It is the Examiner's point of view that the Applicant's argument is over commensurate the scope of the claims since such language is not included in the claims. The claimed "sputtering" however is simply interpreted as projecting or radiating the patterned/projection beam on the cap layer.

Thirdly, as discussed above, the binding of the hydrocarbon gas molecules on the surface forms the layer on that surface. This layer however is dissociated by the secondary electrons from the surface. As a result, the thickness of such layer would not increase substantially over time due to the dissociation.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S. NGUYEN whose telephone number is (571)272-2151. The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D. MEIER can be reached on (571)272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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/LAM S NGUYEN/  
Primary Examiner, Art Unit 2853